Chambers's Journal
SIXTH SERIES.

ON RICE-MEAL.

A SUGGESTION FOR INDIAN FAMINE RELIEF.

By GEORGE S. KEITH, M.D., Author of *A Plea for a Simpler Life*, *Fads of an Old Physician*, &c.

I HAVE always believed—and this is the general belief—that rice, which is the principal food of the natives in many parts of India, is mostly a pure starch, and contains very little from which to form a strong body of muscle and bone. I was undeceived as to this when on a recent voyage to Rangoon. I had asked if brown bread was to be had on board, and was told that it was not, and that there was no wheaten flour to make it from. A few days after I was surprised to see it on the table, and of excellent quality. On inquiring of the baker, a very intelligent Scot, he told me the bread was made from white flour and rice-meal, four parts of the former to one part of the latter. He had used this for more than twelve months when brown bread was asked for.

This rice-meal is got in the process of cleaning rice in the rice-mills of India. From the rough *paddy* the husk is first rubbed off; part of it is used in the mill as fuel, and the rest is thrown into the sea. What is next removed is the rice-meal. This is sent to England, and is given to the pigs or made into oil-cake for fattening cattle. On my return voyage the vessel brought nearly one thousand tons of it in bags to Liverpool, where it is in great demand. It is not known to any of the corn-dealers in Edinburgh. Twelve months ago it was selling at about three pounds a ton; lately, owing to the high price of all feeding-stuffs, it has been quoted at from four pounds fifteen shillings to five pounds. I brought some of it home, and it makes excellent brown bread when used in the above proportions. I have also some of the partly-cleaned rice, from the further cleaning of which the rice-meal is obtained in quantity varying from 7 to 16 per cent. In a specimen of the partially-cleaned rice which I got from the largest mill in Rangoon, a considerable portion of the rich meal has evidently been lost in cleaning off the husk, as only 10 or 12 per cent. of the grain, and this the smaller size, has retained its natural red colour, which is somewhat darker than the natural grain of wheat. Hence it is probable that the rice could give even a higher proportion of meal than 16 per cent.

I have got an analysis made of this meal by the chemist of Messrs Duncan & Flockhart, Edinburgh, and, although it had lost some of its flesh-and-bone-making ingredients, it was found to contain 12½ per cent. albuminoids, and 4½ per cent. phosphoric acid, which, in union with lime, as phosphate of lime, makes up the greater part of the ash, amounting to 7¾ per cent. The meal is thus very rich in albuminoids and phosphates.

On the bank of the Irrawaddy I happened to see about a ton of rice which had been freed from the husk, but still retained its red colour; and I was told in Rangoon that the natives sometimes clean the rice for themselves, and use it in the form in which I saw it. I heard recently from an engineer who has for some time been in charge of railways in Assam that red rice is used by the natives, who are a finer and stronger race than the Hindus. I have also been told of a family in the West of Scotland who have been in the habit of getting red rice regularly from Ceylon.

In this country the value of rice as a food is reduced still further by the mode of cooking. It is boiled in a large quantity of water. This takes out most of the albuminoids, and as the water is thrown away, these are lost. In India the water used is just enough to swell the rice, and everything is preserved. Parkes gives 5 per cent. as the proportion of albuminoids in white rice, and 11 per cent. in white flour.

I have endeavoured to get the Government of India interested in the rice-meal question. It is a pity that the best part of the rice should be sent to this country for cattle when it is so much

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needed in India, especially for the young. As a matter of pure economy it is important that it be retained in the country. Two parts of our brown wheaten bread go as far as three parts of white bread, both in satisfying the appetite and in supplying the wants of the system. If the same ratio holds as to red rice and white rice, a great money-saving would be effected by substituting the former for the latter. The price of rice-meal got in cleaning white rice for this and other countries is also less than that of white rice; but this is of small importance compared with its value as a food. It makes excellent porridge.

A time of famine may be the best for introducing a change in the habits of the people. As red rice is already used in some parts of India, its general use should not be a great difficulty. When we consider that brown bread is so little used among ourselves, though its use is increasing among the upper classes, and that as yet far the greater quantity of wheat consumed in this country goes to the pigs, we need not be surprised that in India also this thriftless system prevails, to the deterioration of many millions of people. In this country the matter is of less importance as, overfeeding being the rule, the poor white loaf may often do less harm than the richer brown one. In a poor country like India, where the people are underfed, the case is very different.

OF ROYAL BLOOD.

A STORY OF THE SECRET SERVICE.

CHAPTER XXII.—THE PRINCESS ASKS A FAVOUR.

'MÉLANIE!' I cried joyously, dashing towards her with outstretched hand. Our eyes met. In hers I saw that same sweet, well-remembered love-look which had given me courage to confess the truth.

She uttered only one word in response, 'Philip!' in a low earnest tone; and then, as her tiny, trembling hand touched mine and thrilled me with a fond pressure, her puzzled gaze wandered again to the woman in black who stood by statuesque and motionless.

In an instant the truth flashed across my mind. Mélanie was annoyed at finding her guest in conversation with me. Perhaps, too, a slight jealousy had arisen in her. As she stood there my eyes were held to her in fascination. Her cool morning-dress of white muslin, girdled narrowly but distinctively with pale mauve, gave her an indescribably dainty appearance; her complexion, fresh and natural, bearing no traces of that artificial softness which even girls in their teens nowadays affect by means of cosmetics. How different were these two women, the one ingenuous, pure, honest, and as healthy in mind as in body; the other a painted, powdered woman of the world, steeped in the cardinal sins, and crafty, unscrupulous, designing, and unmerciful—a woman whose history had been more remarkable than any romance!

By what means, I wondered, had Judith Kohn managed to obtain an invitation to Brandenberg? Few indeed were accorded that honour outside the immediate family circle, with the exception, of course, of the usual annual visit of the German Empress and her children. Once or twice in autumn the Emperor himself also came there to hunt in the great forests which stretch eastward across the Rhineland, but by the Hapsburgs the stronghold of their ancestors was always regarded as a place sacred to summer repose *en famille*. Numerous guests were invited to the great white palace in Vienna, or to the fine villa at Beaulieu, near Nice, where the winter was always spent, but never to Brandenberg.

At a motion from Mélanie the woman Judith reluctantly turned and, with threatening glance at me, moved out, closing the door after her. I was scarcely prepared for such obedience on the part of one so defiant, and the instant she had gone I asked, 'Who is that woman?'

'Julie, my maid. She has not been with me long. But you apparently know her,' she said. 'You were talking when I entered.'

She had overheard my denunciation. Should I now show open defiance and speak, or was it wiser to hold my peace? An instant's reflection decided me.

'Yes,' I answered; 'I do know her. But she is scarcely the kind of person to be your maid.'

'Why?' she asked, in quick surprise. 'Impertinence seems to be her only really bad quality. She is a splendid linguist, a good pianist, and rather more fitted for companion than maid. From her chance remarks I know full well she has once moved in quite a good circle herself.'

'Who recommended her to you?' I inquired anxiously, wondering with what design she could have entered Mélanie's service.

'Lady Thirlmere, one of my friends in London.'

'Then her ladyship must have been ignorant of who she really is.'

'Who is she?' asked the Princess, puzzled.

'Her name is Judith Kohn, the political agent in the employ of the Ministry of Foreign Affairs at Berlin,' I answered.

'A spy?' she gasped.

I nodded, adding, 'And further, she it was

who acted with that man Krauss, and induced him to prepare the plans of the Austrian frontier forts.'

'Ah!' she cried quickly, 'I recollect. You told me that she was even worse than Krauss, and that she escaped from Austria with the assistance of the German Embassy. And I have actually taken her into my service!' she said, astounded at my revelation.

'Undoubtedly her presence here is part of some well-laid plan,' I said. 'With a woman of her character it behoves one to be ever on the alert. Why has she taken the trouble to enter your service?'

'It is extraordinary. How can I tell?'

'Reflect. Is there any secret of prime importance which is in your keeping? You, a member of a Royal House, may be in possession of something which it is the object of your enemies to obtain?'

She was silent. In an instant her face was blanched to the lips.

'Ah!' she cried suddenly, as though some hideous truth had at that instant dawned upon her. 'Yes; I see it all now! There is a deep and cunningly devised plot. The *coup* would have been made quickly, perhaps even to-day, had you not thus given me timely warning.'

'A plot against you?' I suggested.

'Yes,' she faltered hoarsely, 'against me.'

Then she stood silent, deep in thought. Her mouth was hard set, and in her eyes was a look of desperation strangely out of keeping with the calm beauty of her countenance.

'This woman,' I went on, 'is possessed of a devilish ingenuity. Not a year ago I discovered her as wife of an official in our Foreign Office in London. She was leading a life of strict gentility at Richmond, the adored of her husband and the admiration of her suburban neighbours.'

'You think she had actually married him in order to obtain some secret at the bidding of her masters in Berlin?'

'Undoubtedly,' I responded. 'Gordon Clunes, her husband, died mysteriously, poor fellow! and she afterwards disappeared—to America, I believe. From that moment until a few minutes ago I have neither seen her nor heard of her whereabouts. But has the man Krauss—the spy whose release you obtained from the Austrian Emperor—never mentioned her?'

'Yes. After your statement I demanded of him the whole story, and he related it to me. He told me of this mysterious woman who enjoys the patronage of all the Embassies of Germany throughout Europe, of her artfulness, her daring, and her unscrupulousness; yet I never for one moment dreamed that this very woman, whose name is the synonym of all that is crafty and evil, was actually the one who waited upon me daily, and whose gossip was so bright and interesting.'

'Strangely enough,' I said, 'the King is extremely anxious to meet her. For months I have been in search of her in order to induce her to obey the royal command to go to the Palace.'

'The King!' she gasped. Then, after a second's pause: 'No, no, Philip! They must never meet.'

'Why?' I inquired, surprised.

'Philip,' she said earnestly, stretching forth her hand and grasping mine, 'you love me—do you not?'

'Yes, dearest. It is because I love you, because I could no longer bear your absence, that I have come here to-day, even at risk of your displeasure.'

'Then I may trust you?' she said in a deep tone of earnestness.

'Of course you may,' I replied.

'Ah! for my sake, for love of me, Philip, do not take this woman to the King.'

'But why?' I argued. 'I have reason to believe she could give certain information that might change the present critical outlook in Europe. You, of course, have heard sinister rumours of antagonistic alliances and of war.'

'Listen, Philip,' she said in a low voice, breathless in the intensity of her anxiety. 'If the King and Judith Kohn meet, the outcome of the interview will be disastrous to me, to my family—to my House. I am in grave peril. You love me. Once you declared that if you could ever render me assistance you would do so. Will you not help me, now that I am in sore need of your protection?'

I had made a promise to the King. Whatever the object His Majesty had in seeking an interview with this mysterious female agent, it was undoubtedly of prime importance. Yet with this appeal of my well-beloved in my ears, how could I turn aside and disregard it? From the very fact that Judith was acting as her maid it was apparent that she harboured some evil design; therefore it was but my duty to stand by and assist Mélanie. I had exposed this woman whose marvellous cunning had shaken empires to their foundations; and well I knew that ere long she would launch her charges against me mercilessly. The storm of her indignation and vengeance would be terrible.

'The King's command should be obeyed,' I said. 'Remember that I am a diplomatist, and that my own country and his are in complete accord.'

'No! no!' she cried, with a passionate outburst. 'No! you will not, Philip,' she implored earnestly.

'I do not see how their meeting could affect you personally, while it is just possible that the revelations which are within this woman's power to make may change the whole aspect of international relations.'

'No, I beg of you, Philip,' she pleaded, holding both my hands in her convulsive grasp, and sinking suddenly upon her knees. 'See!' she cried. 'I beg of you to spare me—to spare me.'

'Spare you!' I exclaimed in wonder. 'I don't understand. Why have you given me no explanation of your sudden flight from Brussels, or of your relations with that spy and traitor Krauss?'

'Because it is absolutely impossible,' she faltered. 'I am bound to secrecy.'

'Then you wish me to neglect my duty, and say nothing to the King of the reappearance of this woman?'

She was bowed before me, and I was holding her trembling hands. From her attitude I saw that she was terribly in earnest, as though all her future depended on my decision.

'It is the first favour I have asked of you, Philip,' she said in a low voice, panting as she spoke. 'I know that your duty to your country is to inform the King; but upon your decision all depends. Ah! you do not know how much I have suffered, or what I am suffering now. You cannot tell the dire result which might accrue if the King and the spy exchanged confidences.'

She shuddered. Her face was blanched, and as her head bowed her lips moved. It seemed as though there, upon her knees, she was praying for deliverance from her mysterious thraldom; and I stood silent and motionless, hesitating whether I should serve my country or the woman I loved so dearly.

The maxim of the philosophical controller of England's destiny, the Marquess of Macclesfield, was indeed one of truth. To be a successful diplomatist a man must needs steel his heart against all feminine blandishments. But there comes a time in the life of every man when he loves honestly and well, and when the happiness of the object of his affections is his primary consideration. My love for the Princess Mélanie had been full of a strange romance, our meetings had been clandestine, and none knew our secret. To be loved by one of the most beautiful and high-born women in Europe and placed on equality with her, poor as I was, had aroused within me a new zest for life. Could I disregard the appeal she made before me on her knees? I glanced down at her, and saw upon that pale, troubled face a look of intense anxiety such as I had never before witnessed. Tears too stood in her dark, luminous eyes as she once again raised her face imploringly to mine. Those tears decided me. I never could bear a woman's emotion.

'If you wish me to neglect my duty, Mélanie, then I will do so,' I said at last. 'You know how dearly I love you; how every day, every hour, my thought is always of you. Brussels is but a desert now that you have left.'

She rose unsteadily, assisted by me, and then, without a word, threw her arms passionately about my neck and gave way to a flood of tears. Her pent-up emotion found vent as she buried her head upon my shoulder, while I, with my arm around her, kissed her hair and endeavoured to comfort her.

'I am miserable—wretched,' she sobbed. 'I was compelled to fly from Brussels without bidding you farewell, Philip, because—well, because every hour I remained there placed me in greater jeopardy. Forgive me.'

'You were in fear of that man Krauss,' I exclaimed rather severely. 'Tell me the truth. If I neglect my duty to serve you, then surely you will at least be frank with me.'

'Yes,' she faltered. 'I left in order to escape him.'

'Why?' I asked. 'What power does he hold over you—he a traitor and a spy, and you a princess? Why should you hold him in fear?'

She shook her head mournfully and sighed deeply.

'Surely,' I continued, 'whatever may be your relations, you might openly defy him if you wished.'

'Ah! would to Heaven that I dared!' she cried. 'Alas! it is impossible—impossible.'

'He is your lover,' I said in a deep tone. 'You cannot deny it, Mélanie.'

'I have already denied it,' she answered, with a slight indignation. 'True, I obtained his release; but it was imperative. I did it to save myself, little dreaming that by so doing I was preparing for myself an everlasting torment.'

'To save yourself,' I echoed. 'You speak in enigmas. Why not be more explicit, now that I have promised to assist you with all the power at my command?'

'Because, even now, I dare not tell you everything,' she replied. 'All I can say is that I am in gravest peril, and that if you will you can save my honour, my reputation—nay, Philip,' she added in the voice of one driven to desperation, 'you alone can save me from death!'

'From death! Why?'

'Because exposure is imminent,' she said hoarsely, standing rigid and pale, her hands clasped to her open white brow. 'This woman Kohn has scented out my secret! She knows it, and will betray me! I confess to you, Philip,' she sobbed in low, broken tones—'I confess I am unworthy of your love, even of your esteem. I have sinned, and only my death can make full atonement. Alas! that the love of the Hapsburgs is fatal—always fatal!

SOME EXPERIENCES WITH MODERN MOTOR-CARS.

By Dawson Turner, M.D. (Edinburgh).

HORSELESS carriages are no new thing, for in two years we shall be able to celebrate the centenary of automobilism. In the year 1802 Trevithick constructed a front-steering road-carriage, driven by steam, which attained the speed of ten miles an hour. He was followed in later years by Gurney, Hancock, and others, who designed and constructed most excellent steam-omnibuses, which for some years competed successfully with the horse-drawn coaches. Mr Scott Russell also ran a service of steam-carriages between Glasgow and Paisley, which were always crowded with passengers; but the service had to be discontinued owing to the action of the road trustees in raising barricades of stones which the motor-cars could not surmount. The road automobile movement was eventually killed by the prejudice and opposition of parties interested in horseflesh, by the iniquitous tolls levied on horseless carriages, and by the advent of the railway automotor.

The horseless carriage, thus driven from its birthplace, found an asylum in countries less conservative than Britain. This is the reason why the French are so far ahead in the industry, and we who were the pioneers of automobilism have now to go abroad for the best models and designs.

The horseless-carriage emancipation act—that is, the Locomotives on Highways Act—only came into force on November 14, 1896. Thus British manufacturers have had barely four years for experimental work; and the firms so far most successful in this have been content to profit by the experience of our Continental rivals rather than strike out on new lines.

My knowledge of horseless carriages has been gained mainly with three types of petrol automotors. The first was a French De Dion Bouton quadricycle, which arrived just in time to take part in a picnic excursion along the coast-road into East Lothian. With the exception of a little instruction from the agent of the machine in Paris, I had till this time no experience in managing a motor-cycle. Having procured a gallon of petroleum spirit, or petrol, and filled the reservoir, we started without much difficulty, and had a pleasant run to Longniddry, twelve miles from Edinburgh. Arrived there, I had to give several of our party rides, with the result that my stock of petrol became exhausted, and we had the laborious task of pushing the machine part of the way on our return journey.

Failing in the attempt to procure petrol at a village we passed through, I filled the reservoir with ordinary lamp-oil; but the engine refused to work with this fuel. Determined not to be beaten, and being tired out with the exertion of pushing the machine, I made a bonfire with some newspapers under the reservoir, and continued the heating until I could plainly see the vapour of the lamp-oil escaping up the float-chimney. The result was magnificent, and we covered some six miles at a great speed. Again the motor flagged, and eventually stopped. We had repeated recourse to the bonfire before we reached home late at night. Here, however, let me strongly advise motor cyclists not to attempt this bonfire performance, the danger of which I did not realise at the time. I now regard our escape from a severe explosion as almost miraculous. This motor-cycle carried us some three thousand miles, including a journey to Bristol and back; and, though it afforded us much pleasure, I am unable to recommend it as a reliable means of locomotion.

My next machine was a Daimler five-and-a-half horse-power car made at Coventry. The price of this was £370. The parent company, which manufactures under the patents of the late Herr Gottlieb Daimler, is German; and when the English branch was started it had the assistance of trained engineers from the chief manufactory. The work they turn out is first class in all respects, and the engine is one of the most successful quick-running light oil-motors yet made.

An adaptation of this engine is used by Panhard & Levassor, the leading French automobile makers. It has a two-cylinder vertical engine; the diameter of the piston is $3\frac{9}{16}$ inches; length of stroke, $4\frac{3}{4}$ inches; and the number of revolutions per minute is 720. Tube ignition is used. The diameter of the front wheels is 2 feet 6 inches, of the back wheels 3 feet 3 inches. The steering is effected by a tiller, which moves in a direction opposite to the wheels, which have solid rubber tyres. The method of cooling is by water, which is circulated by means of a pump; and ten to fifteen gallons are carried. There is a spoon-brake on the tyres and a band-brake on the countershaft. The power is transmitted from the motor to the rear wheels by a friction-clutch, tooth-gearing, and chains; and there are four speeds—namely, four, eight, twelve, and sixteen miles per hour. Petroleum spirit of a specific gravity of 0·680 is used. The total weight of the car is about nineteen hundredweight.

Though the Daimler is undoubtedly the most reliable and satisfactory English car yet made, it has certain faults. To some of these I will now refer: (1) It is underpowered; the twelve and sixteen miles an hour speeds can only be used on

good level roads in summer. A touring car to carry four people with their luggage should be provided with an engine of at least eight brake horse-power. (2) Tube ignition has many disadvantages. The most serious one is the danger of the car and its occupants catching fire in case of an accident; others are the difficulty of keeping the burners alight in a wind, and of relighting them, and also the difficulty of getting them to burn with a sufficiently hot flame. (3) Owing to the absence of an efficient water-cooling arrangement, a large dead-weight of water is carried, and this must be renewed every twenty-five to thirty miles. (4) The brake-power is insufficient. (5) There are no efficient means to prevent the car running backwards if stopped on a hill. (6) The tiller steering is too sensitive, and is dangerous at high speeds. I understand, however, that in the latest Daimler cars most of these faults have been rectified.

On the arrival of my Daimler car at the Caledonian Station, in Edinburgh, last January, I went there with a can of petrol to drive it home. I had no difficulty in starting the engine, and all went well until I was about half-way up a steep street, when a snap was heard, the engine stopped, and the car began to run backward downhill. Fortunately, two active friends who were with me were able to stop the car before it had got up any momentum. A subsequent examination of the engine showed that the eccentric rod which worked the water-pump had broken, probably owing to the freezing of the water in the pipes during the previous night. By means of a strap and a piece of cord, the rod was fastened out of the way and an attempt made to start the engine; but the attempt was in vain. In turn we all tried to start the engine; but go the right way it would not. Eventually, however, it began to run backward, and then the happy thought occurred to me that by putting the reversing gear into action the car might be persuaded to move forward. I tried this at once, and, to our intense relief, it forged slowly forward, and so went to the coach-house. We must have spent fully two hours in the street, and I had just resolved to get horses to pull the car home when we succeeded in moving it.

A short time after this accident, while leaving the Queen's Park, Edinburgh, by St Leonard's Hill, the car suddenly began to run backward, and before we could do anything it had run violently into the wall at the side of the road. Fortunately the hood, which was projecting behind, served as a buffer and saved us from injury. Until I got down and noticed that one of the chains had come off I had no idea what the cause of the mishap was. This is one of the points requiring particular attention in the construction of a new car; for the chains are liable to stretch and come off, and usually do so at the most awkward times. On another occasion an admission-valve spindle broke when I was taking a friend for a drive on the outskirts of the town; and we had to push the car into a dairyman's yard and walk home.

Otherwise, I have only had trouble with the burners and tubes; but this occurred pretty frequently. Last August we started with two friends for London, spending the first night at Moffat and the second at Penrith; but the speed of the car, in consequence of the burners acting badly, gradually diminished, until it was only with the greatest difficulty we managed on the third day to get over Shap Fells, a rise of one thousand three hundred feet. Further, when descending on the other side, I had, in consequence of the somewhat precipitous incline, great difficulty in holding the car in check; and when we reached the bridge at the bottom the car was enveloped in smoke. Here we jumped off quickly and removed the spare cans of petrol and our luggage. It was then discovered that the brake-strap, owing to the long-continued and intense friction, was smouldering. Two or three buckets of water put this right. One of the burners, however, had gone from bad to worse, and now it would not light at all. We had therefore to continue our journey to Kendal on one cylinder. So far I had only endeavoured to doctor the tube-burners themselves; but on our arrival at Kendal I determined to examine into the condition of the tube that conveyed the petrol from the reservoir to the burner; and here I found the origin of our trouble, for the tube was almost blocked at one place with a curious deposit from the petrol. After this had been removed the burners gave us much less trouble.

Leaving the Daimler in London, I went to Paris to drive back a car which had been on order for some months. This car was made by the Delahaye firm, of Tours and Paris, and its cost is £450. It is a four-wheel phaeton. There are two horizontal cylinders placed at the back. The diameter of the piston is 4·33 inches; length of the stroke, 6·29 inches; with about 725 revolutions per minute. The diameter of the front wheels is 34 inches, of the back wheels 43 inches, and the tires are pneumatic. The ignition is electric; the brake horse-power 10·8. Power is transmitted from the motor to the wheels by belts and chains. There are three band-brakes—one on the countershaft and one on each driving-wheel; and a ratchet arrangement prevents the car from running backward downhill. A very efficient water-cooling arrangement, consisting of thirty metres of copper piping, is placed in front, to be cooled by the air, the result being that only three gallons of water are carried and two hundred miles or more can easily be run without renewal. A device is provided whereby the compression is relieved while the engine is being started. The fuel used is petroleum spirit, and the average

cost per mile for the fuel, at one shilling a gallon, is 0·36 pence; thus four people could be conveyed from Edinburgh to Carlisle at a cost of less than ninepence each for fuel.

This car has given me very great satisfaction. It is undoubtedly much superior to anything yet turned out in this country, one of its chief merits being the efficiency of its brake-power. When descending a gradient of 1 in 12·9 at a speed of sixteen miles per hour, it was stopped in twelve and one-third yards (automobile club trials). Further, there is ample reserve-power, and it will ascend the slope of Liberton Hill, Edinburgh, at an average speed of eight or nine miles an hour.

A few lines will be sufficient for a narrative of my journey on this car from Paris to Edinburgh. We left Paris with a *mécanicien* from the works, who to my mind drove far too recklessly through traffic. The only incident on the first day's journey, however, was the catching up and running over of a hen. We slept at Rouen; and the next day, on our way to Dieppe, the connecting water-pipe broke, causing a delay of several hours. As motor-cars are only carried by the night-boats of the Dieppe-Newhaven service, we had to drive to the wharf about midnight. Here the captain informed us that the sea was too rough to permit him to take the car, so we had to return to our hotel.

Next morning we drove the ninety miles to Boulogne; and, after waiting there two days for calmer weather, we crossed by the day-boat. Arrived at Folkestone, we found that great caution is required to prevent the wheels getting between the rails and the planking; and in spite of the greatest care, I unfortunately got both fore and aft wheels firmly wedged in. It took the united efforts of some fifteen men to lift the car out.

During our drive to London the engine stopped at Mitcham. I now found the water-pipe had broken just where it gave way before. We had been running for an unknown period without cooling-water, and the engine had stopped from overheating. It was raining hard and blowing a gale; I therefore had to crawl under the car, detach the broken pipe, and then walk some distance to an engineer's shop to have it repaired; this done, I replaced it, filled up with fresh water, and then, to my joy, found that the engine worked quite satisfactorily. Since then the water-pipe has given me no trouble.

We stayed a night at Oxford, Kidderminster, Liverpool, Windermere, and the Gordon Arms, Yarrow. We ran on an average about ninety miles a day, and were nearly always at our resting-place for the night before 4 P.M. Our longest day's run was one hundred and fourteen miles.

Three chief types of motors have been used for the propulsion of horseless carriages: steam-engines, petroleum-vapour or gas engines, and electric motors. Steam holds the field for wagons or lorries; its chief advantages are its elasticity, its variable speed, very great range of power, and self-starting action. Its disadvantages are that a fire and a boiler are required; consequently it cannot be started at once, steam must first be raised, and constant vigilance must afterwards be exercised as to the state of the fire, the pressure of the steam, and the supply of water.

Oil-motors or internal-combustion engines are of two kinds: heavy oil, and light oil or petroleum spirit or petrol. Attempts have been made in this country by Roots & Venables, and on the Continent by Koch, to utilise ordinary petroleum. These attempts will no doubt be eventually successful, and will result in a great saving of trouble and expense, because ordinary petroleum can be obtained almost anywhere, and at a cost of less than half that of mineral spirit. At present there are difficulties connected with the vaporisation of the oil, the deposits which form in the cylinders, and the smell of the exhaust. Chiefly for these reasons the petroleum-spirit engines are at present to be preferred. They have as compared with steam the following advantages: they are always ready and can be started at once; when once started they practically require no looking after, but will run on as long as the supply of spirit is maintained. The consumption of fuel is less, and the consumption of water in a modern car fitted with a radiator is practically nil.

To mention some of the disadvantages of oil-motors: they have neither much range of power nor capability of variation of speed; thus a complicated transmission-gear between the engine and the driving-wheels is necessary; they must be started by hand, and cannot be reversed; and there is more vibration, which naturally is most noticeable when the car is at rest.

For touring purposes the petroleum-spirit car is at present unsurpassed. Provided with a few gallons of the spirit, the autocarist is enabled to travel immense distances at high speed, and he has an engine that never tires and requires scarcely any attention. Arrived at his destination at night, he has only to extinguish his ignition and turn off the petroleum spirit, and the car will receive no damage and will undergo no deterioration though he should not return to it for an indefinite period.

The third source of power is electricity. This will probably be the motive-power for light carriages in the future. The chief advantages of electrically propelled vehicles are: the motor is always ready, and it is a self-starter; great variations in power and speed can be obtained by proper arrangement of the cells, and thus the complicated transmission-gear of the oil-motor becomes unnecessary; there is less vibration and

less noise than with the steam or oil engine; and there is no smell and no exhaust.

Against these great advantages we must place the following disadvantages: the electricity must be carried with you in the form of the stored chemical energy of accumulators, and no light and durable accumulator has yet been discovered. Even were this difficulty surmounted, another would appear, due to the want of sufficient conveniently situated charging stations. With the best accumulator procurable it would scarcely be safe to tackle a distance of more than twenty-five miles, and when this distance was completed an hour or two would be lost in recharging the accumulators. Those who have had experience with accumulators, even when placed under the most favourable conditions—at rest in a laboratory—would probably be inclined to admit that the accumulators of an electrical car would—owing to the spilling of acid and detachment of the lead-paste caused by the jolting—be an endless source of trouble and anxiety. At present the electrical car is only a luxury for the rich, and suitable for running short distances in a town or in the vicinity of a charging station; and it requires the services of a trained electrician to keep the accumulators in order.

Amongst minor general points, it is to be noted that belt transmission-gear is preferable to toothed-wheel gear, chiefly because the former is absolutely silent, is flexible, and no friction-clutch is required; speed changing is effected smoothly and without jerks; and not only is the first cost less, but the expense of renewal is trifling.

Electric ignition or magneto-electric ignition will no doubt eventually completely displace tube ignition. The danger of the car catching fire from the lighted burners in case of an accident is of itself a sufficient reason for preferring electric ignition.

In conclusion, it may be urged here that the law regulating the speed of motor-cars should be amended. In England motor-cars are permitted to travel on country roads at twelve miles per hour; in Scotland, where the average country roads are far less frequented, the speed must be reduced to ten. What our legislators have failed to perceive is, that danger to the public does not depend so directly on the speed at which a vehicle may be travelling as on the driver's control in stopping suddenly on emergency, and on the facility with which the car may be turned aside to avoid collision. It is not too much to assert that a properly equipped motor-car can be pulled up in one-third the distance required for a horse-drawn vehicle. Further, as regards manœuvring and turning, the shortness of an autocar permits this to be effected much more readily and in less space than a similar movement by a horse-drawn carriage would require. In my opinion, any attempt to fix a speed limit is a mistake; the ordinary law as to furious driving, which applies to all vehicles, is amply sufficient to control the driving of motor-cars. Thus, while a speed of six miles an hour in the crowded parts of a city might rightly be regarded as furious driving, a speed of twenty miles an hour, or more, on perfectly clear country roads might be quite safe. Mr Outhwaite, manager of the Edinburgh Autocar Company, Limited, made a record run with a heavy motor-car. Leaving Edinburgh at 9.5 P.M. on 14th March, Mr Outhwaite drove *viâ* Berwick, Newcastle, and York to Selby, a distance of two hundred and twenty-one miles, without once stopping, reaching the latter place at 2.45 P.M. on the 15th. This is the longest 'non-stop' run which has been accomplished in Great Britain, and goes far to prove the perfection to which self-propelled vehicles have now been brought.

The Automobile Club of Great Britain has amongst its five hundred members the Lord Justice-Clerk, Earls Talbot, Carnarvon, and Shrewsbury, Sir Francis Jeune, Sir William Gordon-Cumming, and Sir David Salomons. The Scottish Automobile Club, whose temporary offices are at 4A St Andrew Square, Edinburgh, has amongst its vice-presidents Lord Saltoun, the Lord Provost of Glasgow, Sir James Pender, Sir Lewis M'Iver, and Sir John Murray. It made the local arrangements for the Automobile Club thousand miles trial, for which more than seventy automotors have entered. The route chosen for this trial is from London, *viâ* Bristol, Birmingham, Manchester, and Carlisle, to Edinburgh, and from Edinburgh, *viâ* Newcastle and Leeds, to London. The vehicles were timed to leave London on April 23, and reach Edinburgh on May 1. Hill-climbing competitions were organised at Shap Fells, Dunmail Raise, Grasmere, and Birkhill, Moffat, and certificates and prizes will be awarded to the vehicles which acquit themselves best.

The opposition manifested in some quarters to horseless vehicles is of the same character as the bitterly antagonistic feeling to the introduction of railways, tramways, and bicycles. Opposition did not succeed in the past, and it will assuredly fail in the case of motor-cars. The purchase by the Prince of Wales of a six horse-power Daimler motor should still further remove prejudice and popularise automobilism.

ANOTHER MAN'S BAG.

THE NARRATIVE OF EX-PROFESSOR CROSSLEY.

IN FOUR CHAPTERS.—CHAPTER IV.

THE Chief Constable was at the other end of the compartment, and Mr Charles Ashdon had taken the corner opposite myself. When he had looked once at me he gave an exclamation of wonder.

'Upon my word,' he said, 'the Carlyle man!'

I was so taken aback by what had happened that I scarcely noticed the rudeness of the remark. But, without the slightest sign of guilt or consternation, he apologised at once.

'I beg your pardon, sir. That slipped out unawares. So startled, you know, to see you here like this.'

He replaced his hat, and returned the handkerchief to his pocket. Then he began to realise the strangeness of our meeting, and was visibly puzzled. He looked hard at my clothes, for I still wore the garments which I had borrowed for my meeting. After that he turned his attention to my companion, and gave him a sharp and scrutinising glance. For myself, I scarcely knew what to think, and could only wait in bewilderment. My feeling was that everything was in confusion; that a house of cards was falling about my ears. I was aware, however, that the Chief of Police was watching both of us from his corner with quiet interest.

'A friend of yours?' asked Mr Ashdon suddenly.

'Ye—es,' I stammered. 'Mr—Mr'——

'Wade,' said the Chief of Police, with a nod. 'Mr Wade.'

The representative of Fillottsons nodded in return. 'Glad to see you, Mr Wade,' he said genially. 'I fancy I've met you somewhere before.'

Then he turned back to me. 'Upon my word,' he began again, 'but this *is* a surprise! I thought you intended to stay at Leachester for the night, you know. Going down to Boltport?'

'No,' I replied. 'I—we—we're going to Hinton Junction.'

'Indeed? Friends there?'

There was no other way out of it. 'Yes,' I said.

It was plain to me by this time that I had made an awkward mistake, and had brought myself into a delicate situation. It was borne in upon my consciousness, as soon as I looked at the man's face, that there was a shocking blunder somewhere. If he had been guilty he would have been alarmed at this meeting; but he showed not the slightest trace of alarm. He was no burglar, no diamond thief! I could read it in his face, in his voice, in his manner.

I tried to pull myself together, as the saying goes, and to recover my presence of mind; but this was a difficult thing to do. Rarely indeed have I found myself in such a painful and puzzling position. Mr Ashdon was surveying me once more with visible bewilderment and curiosity. He was reluctant, perhaps, to put any further questions. Then I saw his eyes turn to the luggage-racks above. Except for his own bag, they were empty.

After that I trembled at the prospect of another question, but it did not come. He turned his attention instead to the Chief of Police. I saw his quick eyes take in every detail of the stiff military figure, and then I saw them brighten slowly. I knew, as if by instinct, that the facts of the situation had dawned upon him. Still, he did not seem in any hurry to speak. He proceeded to make himself comfortable in his corner by taking a reclining position and raising one foot to the cushions. This took quite two minutes, and all the while he was evidently thinking things out. I felt that his thinking would have unpleasant results for me, and glanced at my helper. With his eyes half-closed he was still enjoying the spectacle.

When at last Mr Ashdon spoke it was in quite a pleasant tone. I raised my eyes to his, and saw there a good deal more than he showed me in words. Malice? No, it was not malice. Revenge? Yes; there was something of revenge there, but it was mingled with something else; there was amusement, enjoyment, and a certain playfulness; there was also a trace of contempt. Was it contempt for me? What was coming now? He was addressing his remarks entirely to myself.

'I didn't expect to see you again so soon, Mr Crossley; but I've been thinking a good deal about you since we last met. That was a nice trick you played me by carrying off my bag!'

The tables had been completely turned. Instead of being called to account himself, he was bringing me up before the bar of judgment. With a strange sensation of helplessness, I murmured something about a mistake.

'Mistake?' said the representative of Fillottsons. 'Of course, my dear sir, of course. I am not complaining in the least. In fact, I have to thank you for a very pleasant evening with an old friend. Whom should I meet, when I went to recover my bag, but King of Burfords—Burfords of Belfast, you know, the linen people. He's staying at the "Lion" to-night, and I've been having a chat with him. We got so busy with it that I nearly missed the train.'

The 'Lion' was a Leachester hotel, situated near the station. My calculations had been faulty indeed!

'As it is,' continued Mr Ashdon, looking at me pleasantly—'as it is, I've only lost six or seven hours. The Countess will get her diamonds in time, after all.'

'The Countess?' I gasped; for he had evidently intended me to say something.

'Yes, the Countess, sir. I suppose it never occurred to you that Mr Charles Ashdon should have dealings with the nobility—eh?'

He concluded the question with something like a chuckle, looking first at me and then at the Chief of Police. I can only answer for my own sensations. They were sensations of increasing bewilderment.

'Did you happen to see the evening paper at Leachester?' asked Mr Ashdon.

How I wished that I could say 'No'! I nodded helplessly. 'Then, of course,' he continued, 'you saw the account of the great jewel robbery?'

I could not deny it. 'Well,' he said, leaning forward and touching my knee with his forefinger, 'the diamonds stolen from the Hotel Petersburg are—in—my—bag!'

What did the man mean? I knew that they were in the bag well enough; but my knowledge only added to the difficulties of the situation. But, apparently satisfied with my confusion, Mr Charles Ashdon went on:

'You wouldn't think it, now—would you? There you had the bag in your possession for hours, and I'll warrant you never dreamt it. But if you'd been a prying, inquisitive kind of man, you'd have stumbled upon them, sure enough; and I fancy they would have given you a bit of a sensation!'

I felt warm and uncomfortable, not only because of the words, but because the man's eyes were upon my face. He kept them upon my face while he continued:

'I can just fancy, now, what a prying sort of man would have done in your place, if he'd rummaged the bag and afterwards seen the accounts in the paper. He'd have gone straight to the police with his story—and with the bag too. And if the police were stupid enough to swallow all the impossibilities—as they generally are—they'd have been after me all down the line in less than no time.'

With that he glanced at the Chief. But the Chief simply nodded.

'That,' added Mr Ashdon, 'is just what would have happened if you had been a prying, inquisitive kind of character.'

This was horrible. I felt my warmth turn to heat. I did not glance at the Chief; but I knew that he was smiling.

'By Jove!' continued Mr Ashdon in the same tone, 'it has been a splendid joke, though. The landlord of the "Lion" brought us the paper in the smoking-room. "Great jewel robbery," says he; "sixty thousand pounds worth stolen."—"Hullo," says King, "that's in your line, Ashdon!" And sure as I live, Mr Crossley, so it was! It was a full account of my robbery this morning from the Hotel Petersburg!'

He paused to note the effect. The Chief did not move, and I could only stare. This was almost a nightmare to me!

'You should have heard us roar,' continued Mr Ashdon, 'when we'd read it through, and you should have seen King's face. "Ashdon," he said, "if you ever get safe home with that sixty thousand I'll eat my hat. Good gracious, man, what a thundering, reckless kind of thief you are! Suppose the gent who took your bag"—meaning you, Mr Crossley—"suppose he'd happened to peep into the cases! Why, you'd be clapped up in walls in half-an-hour. You look a suspicious character at the best of times—you do. There's something in your eye quite extraordinarily bad and wicked; and if you got caught with those things in your bag, do you think you'd get any one to believe your story"?——

Mr Ashdon paused to give effect to his last words. '"Do you think," said King, "that you'd get any one to believe they were only—*paste?*"'

Paste! At that word I gave a start. Mr Ashdon saw it, but only made a brief pause. He went on, looking in turn at each of us:

'You see, gentlemen, King is a bit of a humorist. Of course, the thing he was talking about could hardly happen. In the first place, even if my bag were taken away by a gentleman in mistake, he would never dream of turning it inside out. In the second place, no man, police or not, would swallow the story. No police-officer would be fool enough to think that a jewel-thief would steal jewel-cases as well as jewels. No police-officer would be stupid enough to believe the report in the *Echo*—that a Countess would be such a numskull as to carry sixty thousand pounds about with her in genuine stones. Everybody knows, in these days, that the real jewels are kept locked up in strong-rooms, while their owners wear facsimiles of them in paste.'

There was another pause. The last sentences had been spoken at, rather than to, the Chief Constable. He, watching me still with lazy eyes, answered quietly:

'Exactly. Everybody knows it.'

The remark was intended for me. I suddenly remembered the scene in his office, and understood. Those last arguments were probably the very points which he had wished to touch upon when I had refused to listen further. It was his turn now!

Mr Ashdon was slightly taken aback by his assent, and there was a longer pause. Then the Chief spoke again:

'That report in the *Echo*,' he said, 'was a bit of smart journalism, at least.'

Messrs Fillottsons' representative laughed. 'Smart, sir? Well, I should think so. A silly girl gives the alarm, and the right man happens to get hold of it. I pity that girl when her mistress gets hold of *her*. Wait a minute, though; I'll show you the jewels.'

He had forgotten, for the moment, his attack upon me. A rising interest in the details of the story had turned his attention aside, and he rose to get his bag. Taking it down, he laid it upon the seat and began to loosen the straps. At the same time he kept on speaking:

'It was a curious affair; but I dare say such things happen oftener than we think. As a matter of fact, of course, the Countess left her family diamonds at home—in the strong-room of a Russian bank in St Petersburg. But she had a sketch made of them by an expert, and sent it to Margate & Fry's to have a set made exactly like the originals. This, you see, is the Countess's first season in England; and though she wouldn't risk her jewels by bringing them with her, she wanted to show them off all the same. Any way, no doubt she felt that she wouldn't deprive the English of a sight of her historic gems. So she took the sketch to Margate, of Regent Street. Margate, of course, sent the order to us, as he sends all such orders. Perhaps you know, gentlemen, that Fillottsons' one special line is—paste diamonds?'

The straps were thrown off and the catches slipped back. Mr Ashdon took out a noisy bunch of keys.

'It was rather a hurried piece of work, but I waited on the Countess yesterday with the jewels. She was not at all satisfied, as it happened, and was able to point out one or two things which could easily be bettered. A keen old lady is the Countess, and she knows all the points of her jewels, I can tell you. But she decided to wear them last night to a ball, and to send them back with me next day—that is, this morning. "And I must have them back by Monday," she says. "There is a reception at the Russian Embassy on Monday, and you must bring them back, better. I shall meet some people there who know my jewels, especially the rose diamond. I must have them back on Monday."'

The bag was unlocked and opened. First appeared the layer of magazines, and under that the closely-packed garments. Mr Ashdon removed them, speaking all the while. He was now a plain, good-humoured commercial, interested in his subject, and ready to talk it out; and I, even in my discomfort, could not but feel a certain interest myself.

'Now,' he said, 'you can see how it happened. The servants knew nothing of me or of my goods. The Countess kept all that to herself; and very wisely, for in an hotel things soon get abroad. Everybody thought these were the real articles come from Russia, and the maids saw them placed in the cabinet after the ball; but they didn't see the Countess take them out this morning and hand them over to me; and she, as it happened, forgot to lock the cabinet after her. So, when I was gone to Paddington, and when she was off to Leatherhead, they found the jewels gone, and raised a scare. A smart man gets hold of it for a Press Intelligence office, and it's all over the country like a shot. And that's all about it!'

That was really all about it. The story was complete, with no necessity on my part for a single question. It was only too easy to see how things had fallen out. Ah, if I had only refrained from looking into those cases!

By this time the Chief of Police was looking into them. Mr Ashdon took up the first, and held it out so that we might see the coronet upon it.

'The Lenstoi coronet,' he said briefly. Then he opened the case, and passed the diamond necklace over to the Chief. 'Now,' he said, 'just look at some of our work. Can you tell it from the real thing?'

I had failed before, and could only gaze at the lustrous pieces in mute misery; but the Chief turned the necklace over carefully, and then stood up in the centre of the carriage. Holding one of the largest jewels to the lamp, he slowly moved it this way and that, to catch the light at different angles.

'Why, you are an expert!' cried Mr Ashdon.

The officer smiled and gave the necklace back. 'Not exactly,' he said; 'but I had an opportunity to study the subject once, and thought it worth while to do so. The power of refraction, of course, is the simplest test of all.'

He returned to his seat, and Mr Ashdon began to return his wares to the bag. Perhaps he thought as he did so that it was a good thing that they were only paste after all. 'It is very seldom,' he said, 'that I meet a person who knows the difference. You wouldn't known it, Mr Crossley—would you?'

He was returning to the attack. Once again I began to wish myself out of the carriage. His keen eyes were upon my face, and I moved helplessly beneath them. Replacing the bag, he went on—mercilessly:

'It was lucky that it was you that took the bag, sir, at any rate. If it had been one of those prying, inquisitive people I have been speaking of, why, I might have got into no end of a bother. It's a good thing to travel with gentlemen!'

I hated the man at that moment. The Chief, from his corner, was watching me, and I felt, though I did not see, the gleam of amusement in his eyes. With it all I could only take off my glasses, rub them for a very long time, and return them to their place. In my heart I thanked Heaven that we were nearing the end of our journey.

It was a relief that Mr Ashdon, having been placed on the trail of business, could not easily leave it. He commenced to tell us now how the Countess's diamonds had been made, and how such articles are generally manufactured. The Chief displayed a good deal of interest; but I could only listen stupidly. There was, I remember, a curious jumble of references to 'Mayence' base, rock-crystal, salt-of-tartar, white-lead, powdered borax, manganese, and metallic oxides. There was also a considerable talk of hot and cold water, crucibles, and mortars; for the making of paste diamonds seemed to be a somewhat complicated affair; but when we ran into Hinton Junction Mr Ashdon drew himself up with a jerk.

'Upon my word,' he said, 'here we are! I suppose we have to part now. I'm afraid I've bored you; but at least I've tried to give you a little information. If at any time, Mr Crossley, you happen to find a hoard of diamonds in another man's bag, you will be able, now, to say at once whether they are genuine stones or not.'

The train stopped, and I hastened to get out. The Chief followed, and stood beside me on the platform. Mr Ashdon shook hands through the open door, and gave a quick look all round. He saw a couple of men standing together at the station entrance.

'Ah!' he said, 'so your friends are waiting. Dear me, Mr Crossley, they look very much like —policemen!'

I did not wait to hear another word. That remark explained everything. He had, no doubt, recognised the Chief at once, and had been enjoying his discovery throughout the journey. I hurried across the platform; but before I had reached the other side the Chief's hand was on my sleeve.

'It is useless to go out,' he said. 'We could scarcely get rooms to-night. It will be better to stay here in the waiting-room, and catch the first train back.'

'When will that be?'

He looked as his watch. 'At six-fifteen in the morning,' he answered coldly.

Five hours! This was pleasant indeed! I stood mute in doubt and helpless wrath; and while I stood the train by which we had come began to move out of the station. I saw the compartment we had occupied, and saw Mr Ashdon in it. He was leaning back in his corner seat, looking over at us and smiling.

. . . . . .

As you will have guessed, Mr Ashdon's story was correct in every particular. In the morning papers it was explained that the Lenstoi diamonds had not been stolen, but that the Countess herself had placed them in security before going out. The subject was dropped at once as far as the public was concerned, and I should have been the last to revive it if I had not been obliged to do so in self-defence. The story is bad enough in any case, but not so bad as some have painted it. In fact, a distorted version of my adventure has lately been published. It appeared first in a Boltport sheet, under the heading, 'The Prying Professor, the Chief Constable, and the Paste Diamonds.' I was described in this as 'a prying old gentleman, whose lack of the sense of humour is only less conspicuous than his conceit, his ill-temper, and his love of meddling.' This absurd slander gradually went the round of the county press, and certain people have at last connected it with me. It appeared in another form in a higher place. This was in the columns of the *Spectator*, where my recently published Carlyle discoveries have provoked so much discussion. In a letter dated from Leachester, the inquiries which resulted in my possession of those documents were declared to be 'an unwarrantable intrusion into the private compartments of Another Man's Bag'!

My narrative, I believe, will show that I was the victim of circumstances rather than of a vulgar, prying curiosity. It will also explain why I am now so careful as to my luggage.

THE TANGYE BROTHERS.

AMONG the many men of mark that the county of Cornwall has produced, the five Tangye Brothers—sons of a worthy Cornish farmer—have gained a world-wide renown in mechanical matters. Their mechanical proclivity showed itself in their early days, and was encouraged in every way by their gifted mother, who foresaw a famous future for her sons, but, unhappily, did not live to witness it. With her dominant spirit pervading them, and led by the eldest brother, James, each of the brothers was attracted into the mechanical world. Joseph, distinguished by his remarkable ability for fine work; Edward, with his gift of inventing labour-saving machinery effecting increased production; Richard and George, with business ability of a high order, all worked together towards a golden future foreseen more clearly by the sanguine Richard, and all cheered on by the jovial, humorous George.

It is not generally known that the first business with which the Tangye Brothers were concerned was that of the manufacture of safety-fuses for blasting. More than thirty years ago they were employed in a small factory in Cornwall for a short time, when James invented an entirely new set of machinery for making fuses.

On leaving this employment Edward went to America, and was a passenger on the ill-fated *John*, which was wrecked on the Manacles in 1855, with the loss of nearly two hundred lives. Edward managed to climb into the rigging, holding on with a determination characteristic of him in later life under less exacting circumstances, and eventually was brought away on a raft. Undaunted still, Edward sailed again for America, where he spent three years; and then he left to join his four brothers in Birmingham, where together they succeeded in founding the Cornwall Works, now known in mechanical circles the world over. Here James was at once the leading spirit in the mechanical department.

The well-known Weston's differential pulley-block, which was chiefly in Edward's department, and the hydraulic jack were the means of first making known the fact that new and energetic spirits were at work in the mechanical world. Later on James devoted his attention to steam-engines, and, after long and laborious experiments, succeeded in making a perfect beam-engine. Eventually Tangye Brothers became famous for their horizontal and other steam-engines and their steam-pumps, the production of which was chiefly due to the genius of James, who on his retirement from active work had made a mark on steam-engines and other machinery for all time.

On the retirement of Edward, after twelve years of arduous work, the idea of improving the process of making blasting fuses presented itself to his mind; and in his small factory at Redruth in Cornwall he laid out machinery on a novel principle of a most accurate and labour-saving class, by the use of which the speed of production is much increased and the cost greatly lessened. These important improvements were gradually brought about by Edward during several years of diligent devotion to safety-fuse machinery, and as a result of a fine appreciation of things mechanical.

Birmingham, as being the scene of their early and brilliantly successful career, has always had an attraction for the Tangye Brothers; and now Edward has removed from Cornwall and settled down in the neighbourhood of Birmingham, and intends devoting himself, like R. D. Blackmore, to the culture of apple and other fruit trees, which, curiously enough, has always possessed a keen attraction for him. His fuse factory has been removed from Cornwall, having been taken over by a large and important concern engaged in the manufacture of kindred articles. Sir Richard Tangye, who has been a frequent contributor to these pages, has given in his autobiography, *One and All*, a narrative of the wonderful rise and progress of the Tangyes.

THE MONTH: SCIENCE AND ARTS.

ELECTRICAL POWER DISTRIBUTION.

THE supply of electrical energy for general purposes from advantageous centres — such as the immediate neighbourhood of coal-mines—is a possibility which experts have foreshadowed ever since electric motors of the modern type were devised. In America and on the Continent power is distributed in this way at from one farthing to a halfpenny per unit, which means that a manufacturer can keep machinery in motion for from five pounds to ten pounds per horse-power per annum; whereas the cost of steam-power for the same work would be three or six times as much. Britain is lamentably behind foreign countries in this matter of electrical power distribution; and, strange as it may seem, the chief cause has been the opposition of local authorities to bills brought before Parliament to accomplish by private enterprise what municipalities are not able to do. The matter is of the first importance. Our manufacturers are already handicapped by foreign competition, which must become more keen if we neglect to obtain our power on the wide-distribution principle. In one case, where the proposed area of supply covers one thousand square miles, on which there are hundreds of factories, the opposing municipality supplies only sixteen and a half square miles with electricity, and that at a comparatively exorbitant price.

THE FATHER OF PHOTOGRAPHY.

The discovery of the art of photography is very generally, but erroneously, ascribed to Daguerre, a Frenchman; but those who have any acquaintance with the history of the art rightly ascribe the honour of its inception to one of our own countrymen, Fox Talbot, the centenary of whose birth has recently occurred. It is a matter of comparatively easy proof to show that Talbot brought his process before the Royal Society some months before Arago introduced Daguerre's name to the French Academy. Still more has Fox Talbot the claim to be the parent of photography when we come to compare his process with that of the Frenchman. Daguerre produced on a silver plate a single picture in the camera, and his process has for many years been obsolete; Fox Talbot, on the other hand, gave us the transparent negative image from which numberless copies could be printed—a method which, in this main feature, is practised in the present day. It is also noteworthy that Fox Talbot gave us a method of obtaining pictures by the action of light on metal

plates, the prototype of the beautiful photogravure process.

EXPLOSIVE BULLETS.

Missiles which come under this category are in reality miniature shells, which explode with disruptive force upon impact, and cause lacerated wounds of an almost necessarily fatal character. By international agreement such bullets are forbidden to be used in warfare, their use being confined to the hunters of wild animals and to whaling expeditions. By a confusion of terms an expanding bullet has recently, in many letters from the seat of war, been described as an explosive bullet; and there is no doubt that the Boers have been using these, which also come under the head of things forbidden. Mr Treves, the eminent surgeon who so nobly volunteered for duty at the front, testifies that a considerable proportion of the wounds received by the British were caused by these expanding bullets; and he believes they were deliberately and vindictively used by the Boers, for large quantities of ordinary ammunition were left behind by them after actions in which the prohibited bullets were employed.

LYDDITE.

The action of lyddite, used for the first time extensively in the present war in South Africa, is variously described by observers, the Boers making light of it, while on our side we receive terrible accounts of its destructive power. The Boers tell us that we altogether exaggerate its effects, that it has done them little or no harm, and that when they are comfortably settled in their trenches a lyddite shell can explode within a few feet of them without causing any inconvenience. Opposed to this we have the evidence of Lieutenant Anderton, whose battery fired lyddite projectiles at the battle of Pieter's Hill. The Boer trenches there were speedily cleared, and in them ninety-eight dead bodies were found, not one bearing wounds. Every man had died from the actual effect of the awful concussion of the lyddite. 'Their hair and beards had turned a peculiar greenish hue, and their skin was of a strange orange-yellow colour.' In adjoining trenches fifty-two living men were found so paralysed with fear that they were readily captured.

PNEUMATIC DESPATCH.

An interesting paper on this subject read to the Society of Arts, London, by Professor Carus-Wilson, described the postal service as by far the most important means of communication of intelligence which London possessed; but he thought an improvement might be effected by the adoption of certain recent advances in mechanical science. At present a letter posted at Westminster reaches the City—hardly three miles away—in three hours; and inquiry showed that accumulation accounted for one hour, handling and delivery of the document for another, while the remaining hour was occupied in transit. What is wanted is quicker transmission from point to point by some rapid means not hindered by surface traffic. The Professor also described in detail the Batchellier pneumatic-tube system employed in certain cities of the United States for carrying the mails. One of these carried two thousand four hundred pounds of letters daily, the time of transit being three minutes instead of twenty-seven under the old conditions. During the discussion which followed the reading of the paper it was stated that the pneumatic system described was already under the consideration of our postal authorities.

ARTIFICIAL PEARLS.

According to a recent consular report from Lyons, there is a demand just now in France for fish-scales to be used in the manufacture of artificial pearls and other ornaments by a new process discovered by a French chemist. For some reason the supply does not equal the demand, and a good price is paid for an article which hitherto has not had any commercial value. The scales should be sprinkled with salt as soon as they are removed from the fish, and packed in tin cans. Specimens sent to the Consulate will be carefully examined and duly reported upon. The idea of using fish-scales for the purpose of making artificial pearls is certainly not as new as this consular report would seem to suggest. A process has long been known by which the silvery scales of the bleak—a little fish common enough in most rivers—can be ground up in a suitable vehicle and used for lining tiny spheres of glass.

THE RESTORATION OF THE BUSTARD.

The Great Bustard has long been extinct as a British game bird, and the last attempt to reintroduce it into this country was made twenty-five years ago. On that occasion a male bird suddenly made its appearance in Norfolk, and the late Lord Lilford supplied from his splendid aviary at Lilford Hall a couple of hens in the hope that the birds would breed. The experiment ended in failure, as two of the birds died and the other disappeared. It is now in contemplation to bring specimens of the Great Bustard from Spain, in the expectation that they may remain here and become the nucleus of a colony of these birds. Ornithologists will be much interested in watching the progress of this experiment.

IRISH TOBACCO.

The practicability of growing tobacco in Ireland as a paying industry has again been considered, and certain members of Parliament, encouraged by the Vice-President of the Department of Agriculture in that country, are urging Government to make the experiment. With few exceptions, experts look upon this proposal with disfavour.

A trial of tobacco-culture in Victoria, where climatic conditions are certainly more favourable than they are in our sister-isle, resulted in failure, in spite of the fact that an American thoroughly conversant with the culture was employed by the Colonial Government to instruct the growers. Tobacco certainly was raised, but it was not of the quality to meet the approval of buyers. After two years' work a consignment of the Victorian leaf was sent to the London market, with the result that the very pick of it did not realise threepence per pound. As to the rest of the lot, it did not find a purchaser at any price. There is little hope that the proposed culture of tobacco in Ireland would prove more successful.

MODERN INVENTIONS USED IN WAR.

Could Wellington revisit the earth and see the marvellous change which has taken place in the methods of warfare since the day when a round ball and a smooth-bore cannon represented the most scientific weapon, he would indeed be filled with astonishment. Not only have our weapons become so perfect that they have an effective range beyond that of ordinary eyesight, but we have also enlisted for service in the field all sorts of appliances which a few decades ago were undiscovered or unknown. An article in *Cassier's Magazine* on 'War Mechanism in South Africa' groups together in a concise manner the various machines and pieces of apparatus which in modern times have been called in to the soldiers' aid. These consist principally of the armoured train; the search-light borrowed from H.M.S. *Terrible*, and used at the front for signalling purposes; the Maxim-gun mounted on a tricycle for quick transport; the modern field-gun; the traction-engines for hauling supplies; the heliograph for flashing sun-signals; the wireless telegraphic apparatus; and, lastly, the gigantic plough or trench-digger constructed by Messrs John Fowler and Co., of Leeds.

ASPHALT PAVING.

This paving material has become so general for street service, in spite of its terrible slipperiness to horses under certain climatic conditions, that a report on its shortcomings embodied in a publication by the Engineer Commissioner of the District of Columbia will be of universal interest. Asphalt is liable to become disintegrated, and in the report referred to this disintegration is placed in three classes—namely, disintegration by cracking, by rolling or waving, and in spots. The formation of long irregular cracks is due to cold, and such cracks occur more frequently in streets where there is little or no traffic, the action of the traffic tending to knead the material together and prevent disruption. Disintegration from rolling or crowding occurs when the surface is too soft, the traffic tending to push the paving into waves or ridges towards the gutters. The spotty condition of asphalt may be due to a number of causes; but one of the most curious causes of deterioration is the absorption of gas from leaky pipes lying below the pavement. This is evidenced by fine cracks in the asphalt, which subsequently becomes much softened, and in some cases is so heavily charged with gas that the material can be lighted with a match. Cases are also known where asphalt has been spoilt by the action of water oozing up from below.

NEW USES FOR REFRIGERATING MACHINERY.

The possibility of attaining a low temperature by means of expanding air has created a vast trade with the Antipodes in frozen meat and other food-stuffs; the refrigerating system of meat-storage on shipboard and on land may, indeed, be regarded as one of the most notable triumphs of the closing century. A new use for cold-storage is indicated in a letter we have received from a correspondent, who states that a London furrier doing a large trade is keeping his goods at a temperature below the freezing-point, with a view to prevent the ravages of moths. It may, therefore, be worth the attention of the proprietors of cold-storage chambers to devote space for the accommodation of furs as well as flesh. It is interesting to learn that plans have been prepared by Rear-Admiral O'Neil, of the U.S. Navy, for the provision on war-ships of refrigerating machinery for keeping the magazines cool, with a view to the prevention of explosion.

LIQUID CARBONIC ACID.

Carbon dioxide—or, to give it its more popular name, carbonic acid—was one of the first gases to be liquefied, and for many years it has been supplied for various industries in steel tubes or cylinders. In this form it is employed largely by mineral-water manufacturers for aerating the various beverages, and it is also used for refrigerating and other purposes. Hitherto the gas has been made by a chemical process, such as the action of dilute acid upon marble dust; but recently a more economical method has been introduced which is described in a French journal. It is well known that in breweries and distilleries large quantities of the gas are given off as a by-product; and the new system, which has found its first installation at Rouen, collects and compresses this gas instead of allowing it to go to waste in the atmosphere. At one large distillery it is computed that sixty thousand pounds of carbon dioxide are allowed to drift away into the air daily, and that if the new system were established there what has always been neglected as a waste product would become a valuable asset.

ELECTRICITY IN MEDICINE AND SURGERY.

Medical electricity has so often formed the subject of quack advertisements that it has been

looked at askance by many members of the medical profession; but there is no reason to suppose that, because adventurers have found electricity a potent charm with which to deceive the ignorant and credulous, this force should not in capable hands be productive of curative effects. A paper recently read at St Bartholomew's Hospital by Dr H. Lewis Jones demonstrated the conditions under which electricity was valuable in medicine, and described the apparatus most suitable for the purpose. Great progress has taken place in the employment of electricity in this comparatively new field of usefulness since electric lighting has become general, for the current can now be easily obtained. Most of the London hospitals have now an electrical department, that at St Bartholomew's accounting for about six hundred patients last year, exclusive of the surgical cases in which the X-rays were called into play. Dr Jones claimed that electrical applications had a large and legitimate field of employment in medical practice, and that the advertisements of electropathic or magnetic appliances—which are very often totally devoid of any connection with electricity or magnetism—do not represent the position of medical electricity.

CURIOUS METEOROLOGICAL EXPERIMENT.

We have all heard of the coaxing of rain from a saturated atmosphere by the firing of heavy guns or the explosion of shells; but the prevention of the fall of hail by the adoption of the same means is certainly new. Experiments for the prevention of damage from hail by gun-firing have during the past year been carried out in several of the Italian provinces, and these experiments formed the subject of a lecture given by Mr J. M. Pernter before the Austrian Meteorological Society. The apparatus employed consisted of an iron mortar provided with an iron funnel six feet long, which protruded from the muzzle like an enormous speaking-trumpet. It was found that when this mortar was fired in the air the explosion prevented a fall of hail, whereas in neighbouring districts out of the zone of fire, or sound, much damage was caused by hailstones. The effect is supposed to be due to the force of the air-whirls formed by the explosion, or to the fact that the electrical discharge between the earth and the clouds was quietly effected by concussion, and thus the chief factor of hail-formation removed.

PHOTOGRAPHING LIVING FISH.

To Mr Douglas English belongs the credit of devising a means of photographing living fish, a matter of great importance to the naturalist, seeing that post-mortem alterations are so rapid that an immense change of form and proportions takes place soon after fish are removed from the water. The difficulties of the work are great, owing to the quick movements of fish, to the loss of light in having to photograph through water, and the terror of the subject during the operation of photographing. Mr English has cleverly overcome these difficulties by confining the living fish in a narrow cell or tank, the sides of which are constructed of the whitest and thinnest plate-glass procurable; and, being movable, they can be approximated to the size of the fish under treatment. Thus life-like pictures of fish have been produced, which should be of immense service to science.

AN EXTRAORDINARY ISLAND.

White Island, thirty miles distant from New Zealand, to the north-east, is perhaps the most extraordinary island in the world. It is an enormous mass of rock nearly three miles in circumference, rising nine hundred feet above the sea, and is perpetually enveloped in dark clouds which are visible for nearly one hundred miles. The island consists almost entirely of sulphur, with a small percentage of gypsum. Some years ago an attempt was made to float a company to work the sulphur, which is of high quality; but, strange to say, sufficient capital was not subscribed. Therefore, the export of sulphur from White Island is still very small. In the interior is a lake fully fifty acres in extent, the water of which has a temperature of one hundred and ten degrees Fahrenheit, and is strongly impregnated with acids. On one side of this lake are craters from which steam escapes with great force and noise. This steam and the vapour from the lake form the dark cloud which envelops the island.

SUNSET.

Behind the bastions of the darkened hills
  Sinks down, in shining rifts, the glowing sun,
  Within whose reddened shrine our fancies run,
And wake in saga-songs and passion-thrills.
Low in the brakes, the softness which instils
  Deep peace; a breeze that rocks the woodland bowers
  To dewy rest; and quivers of perfumes
Break on the air till heart and memory fills!

But, lo! as gazing on the wondrous scenes
  Of shifting change, from gold to purple rare,
  The stately night, inexorable, fair,
With gloomier grandeur hushes 'might-have-beens;'
  And, like to Death, slays life, to wake in being
  A Presence that has Life beyond our seeing!

William J. Gallagher.

*** TO CONTRIBUTORS.

1st. All communications should be addressed 'To the Editor, 339 High Street, Edinburgh.'

2nd. For its return in case of ineligibility, postage-stamps should accompany every manuscript.

3rd. To secure their safe return if ineligible, ALL MANUSCRIPTS, whether accompanied by a letter of advice or otherwise, *should have the writer's Name and Address written upon them* IN FULL.

4th. Poetical contributions should invariably be accompanied by a stamped and directed envelope.

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